HART® Field Device Specification:

Oldham OLCT 200 Revision 1

Initial release: 13 April 2011
Current release: 13 April 2011

Part Number: 77036008
Revision: 02.1

® HART is a registered trademark of the HART Communication Foundation

This page left intentionally blank

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Scope

The Oldham S.A.S gas detection transmitter, model OLCT 200, revision 1 complies with HART Protocol Revision 7.2. This document specifies all the device specific features and documents HART Protocol implementation details (e.g., the Engineering Unit Codes supported). The functionality of this Field Device is described sufficiently to allow its proper application in a process and its complete support in HART capable Host Applications.

1.2 Purpose

This specification is designed to compliment other documentation (e.g., the *OLCT 200 User Manual*) by providing a complete, unambiguous description of this Field Device from a HART Communication perspective

1.3 Who should use this document?

This specification is designed to be a technical reference for HART capable Host Application Developers, System Integrators and knowledgeable End Users. It also provides functional specifications (e.g., commands, enumerations and performance requirements) used during Field Device development, maintenance and testing. This document assumes the reader is familiar with HART Protocol requirements and terminology.

1.4 Abbreviations and definitions

ADC	Analog to Digital Converter
CPU	Central Processing Unit (of microprocessor)
DAC	Digital to Analog Converter
EEPROM	Electrically-Erasable Read-Only Memory

1.5 References

HART Field Communication Protocol Specification. HCF_SPEC-13. Available from the HCF.

OLCT 200 User Installation Manual, Document IMAN123-2003. Available from the Oldham S.A.S.

2. DEVICE IDENTIFICATION

Manufacturer Name:	Oldham S.A.S	**Model Name(s):**	OLCT 200
Manufacture ID Code:	604D (Hex)	**Device Type Code:**	E198 (Hex)
HART Protocol Revision:	7.2	**Device Revision:**	1
Number of Device Variables:	1		
Physical Layers Supported:	FSK		
Physical Device Category:	Transmitter, Non-DC-isolated Bus Device		

The product's nameplate including serial number can be seen on the metal tag on the top of the unit.

3. PRODUCT OVERVIEW

The OLCT 200 is a fixed placement gas detection transmitter intended to monitor for hazardous levels of toxic gases, oxygen, and combustible gases. The transmitter is housed in an explosion-proof enclosure and product features a LCD screen to display gas readings and provide access to the transmitter's menu functions. The device provides both analog 4-20mA and digital ModBus RTU communication and is externally powered by 10-30VDC.

4. PRODUCT INTERFACES

4.1 Process Interface

4.1.1 Sensor Input Channels

Smart gas sensors connect to the transmitter device via standard ten pin connectors. Refer to the Installation Manual for installation details. Operating ranges correspond to the capabilities of each sensor type.

4.2 Host interface

4.2.1 Analog Output 1: Gas Concentration

The two-wire, 4-to-20mA current loop is connected on two terminals marked "+" and "-" on the HART Modem board (P/N 10-0351). Refer to the Installation Manual for connection details. This is the only output from this transmitter, representing the process gas measurement, linearized and scaled according to the configured range of the instrument. This output corresponds to the Primary Variable. HART Communication is supported on this loop. This device has a CN number of 1. A guaranteed linear over-range is provided. Device malfunction can be indicated by down-scale or up-scale current. When a device malfunction occurs the loop current is set to 1mA. The direction is selectable by the user; see Section 4.3 below. Current values are shown in the table below.

	Direction	Values (percent of range)	Values (mA or V)
Linear over-range	Down	-6.25% ± 1.0%	3.0mA ± 0.1mA
	Up	+5.0% ± 1.0%	20.8mA ± 0.1mA
Device malfunction indication	Down: less than	-19%	1.0mA
	Up: greater than	N/A	N/A
Maximum current		+112.5%	22.0mA
Multi-Drop current draw			4.0mA
Lift-off voltage			10.5 V

4.3 Local Interfaces, Jumpers and Switches

4.3.1 Local Controls And Displays

The OLCT 200 has an onboard LCD screen that display gas readings as well as the devices configuration menu screens. The device is operated non-intrusively using a magnetic wand to activate the devices control buttons. Calibration of the device is also performed in this manner.

4.3.2 Internal Jumpers And Switches

None.

5. DEVICE VARIABLES

This Field Device does not expose any Device Variables.

6. DYNAMIC VARIABLES

One dynamic variable is supported

	Meaning	Classification	Units
PV	Gas Concentration	90, Concentration	Engineering Units (240)

7. STATUS INFORMATION

7.1 Device Status

Bit 0 – PV out of limits is not used
Bit 1 – Non PV out of limits is not used.
Bit 2 – Analog Output Saturated is set when the loop output current is below 3.0mA or above 20.8mA.
Bit 3 – PV Analog Output Fixed is set when the loop current mode is disabled.
Bit 4 – More Status Available is set whenever any failure is detected. Command 48 gives details. (See Section 7.3)
Bit 5 – Cold Start is set after a power cycle and reset for each type of Master separately.
Bit 6 – Configuration Changed is set when a HART command modifies the transmitter configuration. Each Master will reset this bit separately by use of Command 38.
Bit 7 – Device Malfunction is set if the Modbus interface between sensor and HART board malfunctions by a communications failure. It is reset when Modbus communications is re-established.

7.2 Extended Device Status

The Field Device cannot predict, in advance, when the maintenance will be required.

7.3 Additional Device Status (Command #48)

Command #48 returns 9 bytes of data, with the following status information:

Byte	Bit	Meaning	Class	Device Status Bits Set
0	0	Channel 1 Alarm 1	Misc.	4
	1	Channel 1 Alarm 2	Misc.	4
	2	Channel 1 Fault	Misc.	4
	3	Channel 2 Alarm 1	Misc.	4
	4	Channel 2 Alarm 2	Misc.	4
	6	Channel 2 Fault	Misc.	4
1	0	Not Used	Misc.	4
	1	Channel 1 Cal	Misc.	4
	2	Channel 2 Cal	Misc.	4
2	3	Calibration Required	Misc.	4
	4	DAC Span Not Calibrated	Misc.	4
	5	DAC Zero Not Calibrated	Misc.	4
	6	Unique Id not Set	Misc.	4
	7	Communication Lost	Misc.	4,7
3		Byte = 0x00	Misc.	4
4		Byte = 0x00	Misc.	4
5		Byte = 0x00	Misc.	4
6		Byte = 0x00		
7		Byte = 0x00		
8		Byte = 0x00		

8. UNIVERSAL COMMANDS

Command #3 returns loop current and PV for a total of 9 bytes.

Command #9 responds to host commands having up to and including four device variable codes. If more than four device variable codes are received, the response is truncated to the first four device variable codes and the response code 30, Command Response Truncated, is returned. Device variable 0 is the Primary variable so the response is identical to the Primary Variable information.

Command #14 returns unit code 240 and NAN value for the upper and lower sensor limits and for the minimum span since these variables are not defined. The serial number is returned as 0 since it is not used.

Command #15 returns not used for the alarm code, transfer function and private label distributor. It returns 251 for the write protect code since it is not controlled by HART Communications. There is no adjustable damping value to the value 0 is returned.

9. COMMON-PRACTICE COMMANDS

9.1 Supported Commands

The following common-practice commands are implemented:

38	Reset "Configuration Changed" Flag
40	Enter/Exit Fixed Current Mode
45	Trim DAC Zero
46	Trim DAC Gain
48	Read Additional Device Status

9.2 Burst Mode

This Field Device does not support Burst Mode.

9.3 Catch Device Variable

This Field Device does not support Catch Device Variable.

10. DEVICE-SPECIFIC COMMANDS

The following device-specific commands are implemented:

128 Read Firmware

129 Read Active Channel

130 Read Sensor Life

131 Read Engineering Units

132 Read Unit Identifier

133 Read Enumerated Variables

134 Read Real Variables

141 Write Engineering Units

142 Write Unit Identifier

143 Write Enumerated Variables

144 Write Real Variables

150 Reset Communications Lost

10.1 Command #128: Read Firmware

Reads the firmware version in ASCII.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Latin-1 ASCII	Firmware Version

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

10.2 Command #129: Read Active Channel

Reads the active channel number.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Active Channel

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

10.3 Command #130: Read Sensor Life

Reads the sensor life remaining.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Unsigned-16	Sensor Life

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

10.4 Command #131: Read Engineering Units

Reads the string value of the engineering units name in ASCII.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-9	Latin-1 ASCII	Engineering Units

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

10.5 Command #132: Read Unit Identifier

Reads the string value of the unit identifier name.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-15	Latin-1 ASCII	Unit Identifier

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

10.6 Command #133: Read Enumerated Variables

Reads the enumerated variable associated with the index value.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Enumerated Variable Index

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Enumerated Variables Index
1	Enumerated	Enumerated Variable

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Miscellaneous Error	Too Few Data Bytes
15	Data Entry Error	Invalid Index

10.7 Command #134: Read Real Variables

Reads the value of the real variable associated with the index.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Real Variables Index

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Real Variables Index
1-4	Float	Real Variable

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Miscellaneous Error	Too Few Data Bytes
15	Data Entry Error	Invalid Index

10.8 Command #141: Write Engineering Units

Writes the string value of the engineering units.

Request Data Bytes

Byte	Format	Description
0-9	Latin-1 ASCII	Engineering Units

Response Data Bytes

Byte	Format	Description
0-9	Latin-1 ASCII	Engineering Units

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Miscellaneous Error	Too Few Data Bytes

10.9 Command #142: Write Unit Identifier

Writes the string for the unit identifier.

Request Data Bytes

Byte	Format	Description
0-15	Latin-1 ASCII	Unit Identifier

Response Data Bytes

Byte	Format	Description
0-15	Latin-1 ASCII	Unit Identifier

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Miscellaneous Error	Too Few Data Bytes

10.10 Command #143: Write Enumerated Variables

Writes the value of the enumerated variable associated with the index.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Enumerated Variable Index
1	Enumerated	Enumerated Variable

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Enumerated Variable Index
1	Enumerated	Enumerated Variable

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Miscellaneous Error	Too Few Data Bytes
15	Data Entry Error	Invalid Index

10.11 Command #144: Write Read Variables

Writes the value of the real variable associated with the index.

Request Data Bytes

Byte	Format	Description
0	Unsigned-8	Real Variable Index
1-4	Float	Real Variable

Response Data Bytes

Byte	Format	Description
0	Unsigned-8	Real Variable Index
1-4	Float	Real Variable

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Miscellaneous Error	Too Few Data Bytes
15	Data Entry Error	Invalid Index

10.12 Command #150: Reset Communications Lost

Resets the Communications Lost Status Bit.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
None		

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

11. TABLES

No applicable tables

12. PERFORMANCE

12.1 Sampling Rates

The table shows the HART interface board update rates.

Dynamic Variable	**Sample Rate**
Measured Variable	1 per second
Analog Output	1 per second

12.2 Power-Up

At power up the device goes through an initialization process that takes several seconds. Communications between the HART interface and the sensor begins about 20 seconds after power up, but the sensor may take longer to initialize the dynamic variables values.

12.3 Reset

Command 42, Device Reset, is not supported in the HART Interface.

12.4 Self-Test

Command 41, Self-Test, is not supported in the HART Interface.

12.5 Command Response Times

Minimum	10 ms.
Typical	25 ms.
Maximum	100 ms.

12.6 Busy and Delayed Response

No delayed response mechanism is supported.

12.7 Long Messages

The longest message response is 37 data bytes when the master requests four slot variables in issuing Command 9, Read Device Variables and Status.

12.8 Non-Volatile Memory

HART configuration data is written to the EEPROM on the HART interface board during processing of the HART command. Sensor configuration data is written to the sensor through Modbus interface by the HART command.

Process parameters are stored in RAM each second and read back to the host on request.

12.9 Modes

Fixed current mode is attained through use of Command 40, Enter/Exit Fixed Current Mode. It is also attained through Command 6, Write Poll Address, when the Loop Current Mode parameter is set to disabled.

12.10 Write Protect

No write protect is provided in the HART interface board.

12.11 Damping

No additional PV damping is provided beyond the sampling of the sensor value by the HART interface board once per second.

ANNEX A. CAPABILITY CHECKLIST

Manufacturer, model and revision	Oldham S.A.S, OLCT 200 Rev 1
Device type	Transmitter
HART revision	7.2
Device Description available	Yes
Number and type of sensors	25 Sensors; 4 types
Number and type of actuators	None
Number and type of host side signals	1: 4 - 20mA Analog
Number of Device Variables	0
Number of Dynamic Variables	1
Mappable Dynamic Variables?	No
Number of common-practice commands	3
Number of device-specific commands	12
Bits of additional device status	13
Alternative operating modes?	No
Burst mode?	No
Write-protection?	No

The Fixed Gas Detection Experts

EUROPEAN PLANT AND OFFICES

Z.I. Est – rue Orfila CS 20417 – 62027 Arras Cedex FRANCE
Tél: +33 (0)3 21 60 80 80 – Fax: +33 (0)3 21 60 80 00
Website: http://www.oldhamgas.com

AMERICAS
Tel: +1-713-559-9280
Fax: +1-281-292-2860
americas@oldhamgas.com

ASIA PACIFIC
Tel: +86-21-3127-6373
Fax: +86-21-3127-6365
sales@oldhamgas.com

EUROPE
Tel: +33-321-608-080
Fax: +33-321-608-000
info@oldhamgas.com